

## OXBOW LAKE (BROWNWATER SUBTYPE)

**Concept:** Oxbow Lakes are permanently flooded open water depressions in large floodplains, isolated from the river by channel shifts. Most are largely unvegetated, but they may contain sparse vegetation or patches of woody or herbaceous wetland plants of various kinds. The Brownwater Subtype covers those along brownwater rivers, which receive substantial mineral sediment input. They typically have an edge zone containing *Taxodium distichum*, *Nyssa aquatica*, *Platanus occidentalis*, or *Betula nigra*.

**Distinguishing Features:** Oxbow Lake communities are distinguished from Cypress–Gum Swamps by being wet enough to lack a closed tree canopy. They are distinguished from Semipermanent Impoundment communities by occurring in closed, undammed basins created by an abandoned river channel. This setting produces an aquatic community that is isolated from both the river and from stream input except in floods.

The Brownwater Subtype can usually easily be distinguished by the character of the river and the occurrence of brownwater communities adjacent to it. It typically has an edge zone containing brownwater species such as *Platanus occidentalis* or *Fraxinus pennsylvanica* as well as the more widespread *Taxodium distichum* and *Betula nigra*.

**Synonyms:** Not covered in NVC.

Ecological Systems: Atlantic Coastal Plain Small Brownwater River Floodplain Forest (CES203.250).

**Sites:** Oxbow Lake communities occur in large floodplains in segments of former river channels that have become isolated from the river by channel shifts. Deposition along the new river course has closed them off, turning them into basins that hold permanent water and are not connected to the river except during floods.

**Soils:** Oxbow Lake soils are treated as inclusions or mapped as water in soil surveys. The substrate is alluvial material. The bed presumably is initially sandy, but over time clay is deposited.

**Hydrology:** Oxbow Lakes are permanently flooded, drying, if ever, only in extreme drought. Except during floods, the water is stagnant and any suspended clay can settle out. In the Brownwater Subtype floods bring pulses of sediment-laden water.

**Vegetation:** The interior of Oxbow Lake communities is open water, generally without any emergent vegetation. The aquatic vegetation is poorly known. The edges generally are lined with trees, which most often include *Platanus occidentalis*, *Salix nigra*, *Taxodium distichum*, *Nyssa aquatica*, or *Nyssa biflora*, less often *Populus heterophylla*, *Ulmus americana*, *Quercus lyrata*, *Carya aquatica*, or other species of brownwater floodplains. *Cephanthus occidentalis* or *cornus stricta* may form a shrubby edge in places. Herbs on the edges may include *Persicaria* spp., *Echinodorum cordifolius*, *Carex* spp. (*lurida*, *typhina*, *gigantea*, and potentially many other species), *Boehmeria cylindrica*, *Proserpinaca pectinata*, *Sagittaria latifolia*, *Hydrocotyle proliifera*, *Onoclea sensibilis*, *Bidens frondosa*, and *Pluchea camphorata*.

**Range and Abundance:** No G-rank is assigned. In North Carolina, the Brownwater Subtype is extremely rare, with only a handful of examples known. Oxbow Lakes are not recognized in the NVC but they potentially could occur throughout the Southeast.

**Associations and Patterns:** Oxbow Lakes are small patch communities. They may occur as isolated lakes or several may occur in close proximity. They are embedded in the floodplain community mosaic of Cypress–Gum Swamp, Brownwater Bottomland Hardwoods, and Brownwater Levee Forest of various subtypes.

**Variation:** No patterns of variation have been identified. Each of the handful of examples is different in its bordering vegetation.

**Dynamics:** Oxbow Lakes are geologically driven communities. They are created by channel shifts, which appear to be rare events in North Carolina’s floodplains. When a meander is cut off, it initially remains connected to the river as a backwater, but sediment deposition on the riverbank fairly quickly isolates it from the river. It will then gradually fill with sediment carried in by floods. It is unclear how long this process takes, but the rarity of oxbow lakes on brownwater rivers suggests they are not geologically long-lived.

Vegetation dynamics may resemble a form of primary succession. The trees on the edge include species that readily establish on newly deposited material, such as *Salix nigra*, species common on riverbanks, such as *Platanus occidentalis*, and species of very wet areas, such as *Taxodium distichum* and *Nyssa aquatica*. As the water becomes shallower with ongoing sediment deposition, these species may spread toward the center. Ultimately the open water will be eliminated, and the depression will succeed to Cypress–Gum Swamp, with the long-lived dominants of that community accumulating over time. A similar process of primary succession was described by Shankman (1991, 1993) for rivers in western Tennessee.

**Comments:** These communities are not well known. The vegetated portions of them, if any, somewhat resemble the primary successional communities of bars or backwaters along the rivers. The aquatic animal and planktonic communities can be expected to be more distinctive, because they offer an environment that is free from interaction with the river community for long periods. These communities are substantially aquatic rather than terrestrial but are part of the Palustrine System of Cowardin because of their small size.

**Rare species:** Vascular plants: *Didiplis diandra* and *Hottonia inflata*.

## **References:**

- Shankman, D. 1993. Channel migration and vegetation patterns in the Southeastern Coastal Plain. *Conservation Biology* 7: 176-183.
- Shankman, D. 1991. Forest regeneration on abandoned meanders of a Coastal Plain stream in western Tennessee. *Castanea* 56: 157-167.